

Preparing Every Student for Alaska's Future

*What does it take to give every student
the 'good stuff' in mathematics?*

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*Reflection
and
Discussion...*

Today's World

- Shrinking, connecting, flattening
- Panic/Participation
- Every person can have a chance,
probably for a future we can't see.

How to Build a 21st Century Student

“This is a story about the big public conversation the nation is not having about education, the one that will ultimately determine not merely whether some fraction of our children get "left behind" but also whether an entire generation of kids will fail to make the grade in the global economy because they can't **think their way through abstract problems, work in teams, distinguish good information from bad or speak a language other than English.**”

TIME, Dec. 18, 2006

Profile of Successful Workers

- Top academic performance
- Creative and innovative
- Able to learn very quickly

What do all students need?

- Economic security
- More math and science than we thought--
- Within a well-balanced curriculum
- Options for future choices and redirections
- The opportunity to develop their potential--
their right as citizens and human beings;
our responsibility as educators

What do all students need in math?

- The Big Three:
 - Understanding math (making sense of it)
 - Doing math (skills, facts, procedures)
 - Using math (thinking, reasoning, applying, solving a range of problems)
- The New Basic: deep transferable skills for *versatilizing*

Two goals

- More workers in math- and science-based fields (STEM)
- Every student quantitatively and scientifically literate to much more sophisticated levels than in the past

Partnership for 21st Century Skills

1. Core Subjects

- English language arts; math; science; languages; arts; civics; government; economics; history; geography

2. 21st Century Content

- Global awareness, financial, economic, business and entrepreneurial literacy
- Civic literacy; health and wellness awareness

3. Learning and Thinking Skills

4. Critical Thinking and Problem Solving Skills

- Communication; creativity/innovation skills; collaboration skills
- Information and media literacy skills; contextual learning skills

5. ICT (Computer/Tech) Literacy

6. Life Skills

21st Century Skills?

Jay Mathews:

“How are millions of students still struggling to acquire 19th-century skills in reading, writing and math supposed to learn this stuff?”

*Reflection
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Responses to Jay Mathews...

- Maybe we need to get rid of some of our 19th-century expectations in mathematics, especially for *those* students.
- Maybe we need to teach mathematics differently, whichever century's skills we want students to learn.
- Maybe the 21st century provides us with tools (technological and teaching) to allow ALL students to learn ALL the mathematics they need to.

What tools does EVERY student need?

- Computational tools (mental, paper, technology)
- Representational tools (paper, technology, other...)
- Collaboration tools (teamwork, communication*)
**oral/written; personal/technology; with and about mathematics; working/presenting*
- Lifelong learning tools (using information, perseverance, learning to learn for life)
- Citizenship/Ethics tools (morality, integrity, equity, responsibility, compassion, accepting diversity)

Compelling Comparisons...

- Who's doing the talking?
- Who's doing the math problems?
- Who's doing the thinking?
- Who's doing the learning?

Typical flow of a mathematics class

U.S.

- Demonstrates a procedure
- Assigned similar problems to students as exercises
- Homework assignment

Japan

- Presents a problem without first demonstrating how to solve it
- Individual or group problem solving
- Compare and discuss multiple solution methods
- Summary, exercises and homework assignment

**Watch out for scaffolding that
morphs into spoon-feeding...**

Why allow struggling?

- Sometimes math problems are hard.
- American students give up--don't persevere.
- American teachers are compassionate.

*Reflection
and
Discussion...*

Engagement...

The key to equity

The key to learning

Teaching for student engagement

- Expecting a lot; eliminating bias
- Choosing engaging tasks
- Talking less; listening more
- Asking questions

Questions

- How do you know?
 - Why do you think so?
 - Can you convince me?
- What's the same about...?
- What's different about...?
- What if ...?

Observations from Frances

- The more I listened, the more I learned from my students.
- When I started asking questions, I found out what the student was thinking.
- It doesn't usually work when I show students their mistakes and then show them how to do it correctly.
- Eventually, the students start asking the questions of each other.

Communication

- Talking helps the talker clarify what s/he is learning.
- Talking helps us catch our own inconsistent thinking.
- Talking helps us remember what we're doing.
- Talking helps the listener figure out what the other person knows.

Constructive struggle and
purposeful conversation can
lead to engagement and to learning.

Getting to the *good stuff*...

*Reflection
and
Discussion...*

***New book coming from
Math Solutions in April 2009!***

Give me an email address to receive release information...

**Messages About Math, Teaching, and
Learning in the 21st Century**

*A resource for teachers, parents, leaders,
and policy makers*

by Cathy Seeley

*E-mail me for a link to a pdf of the slides or to
get information on the book:*

cseeley@austin.rr.com

*National Council of Teachers of Mathematics
(NCTM) <http://nctm.org>*

*Check out my website on Burkina Faso:
<http://csinburkinafaso.com>*